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# AP2 & Debuncher Instrumentation

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DOE Review  
July 22, 2003

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# Outline

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## Existing Instrumentation

BPM systems, BLMs, SEMs, Intensity devices,  
Pickups, Collimators, RF systems

Presented together: next 2 slides

## Usage

Stacking; Reverse protons; Forward protons

Orbits (centering, lattice measurements)

Loss points

Beam Based Alignment

## Upgrades

# Existing AP2 Instrumentation

System	Stacking	Rev prot	Fwd prot	Comment
BPMs (34)		Trying	Yes	Orig AM/PM Mod & DAQ 1/2 of system see kicker
BLMs (0)				System <b>removed</b> several years ago
SEMs (9)	Yes	Yes	Yes	Non-optimal phase advance between SEMs
Intensity (1)	Ion Chamber	Ion Chamber	Ion Chamber	<b>Removed</b> 3inch toroids from 6inch beam pipe
Collim. (5x2)	Yes	Yes	Yes	2 per transverse plane & 1 longitudinal sets
RF for BPMs	From MI	<b>Commis.</b> DRF1 53MHz	From MI	DRF1: <b>Reverse adiabatic cavities curves to "bunch" beam</b>

# Existing Debuncher Instrumentation

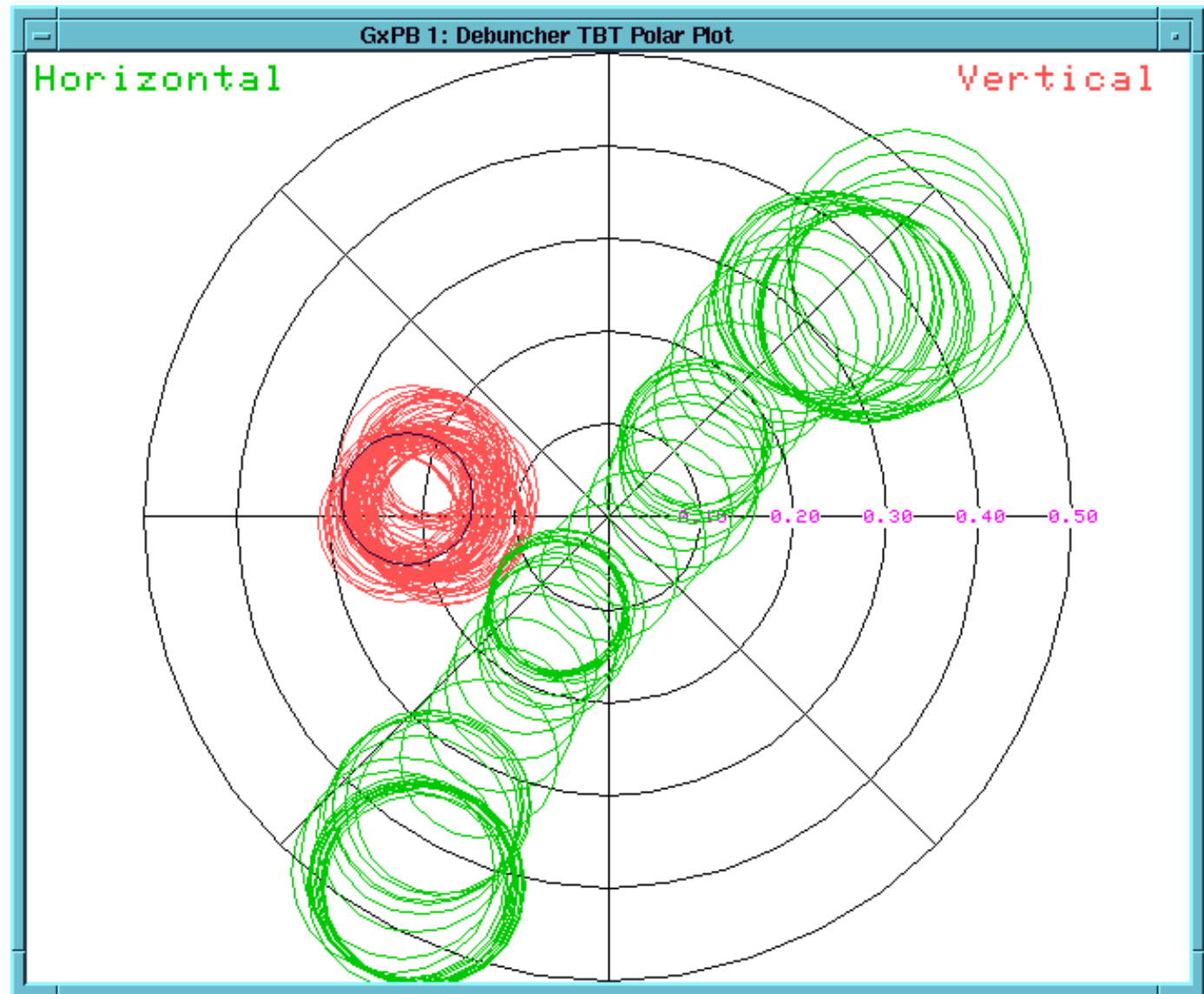
System	Stacking	Rev prot	Fwd prot	Comment
BPMs (120)		Yes	Yes	Orig AM/PM Mod & DAQ Hard to maintain & use
BLMs (62)	Not really	Yes	Yes	
Intensity (1)		DCCT	DCCT	Measures circulating current
Pickups (5)	Yes	Yes	Yes	2 are used for stacking TBT or as studies "heater"
Collim.	Yes	Yes	Yes	1 scraper per plane
RF for BPMs		Re-comm. DRF3 2.5MHz	To be used	Studies RF system; new controls

# Debuncher TBT Instrumentation

Used for  
closure

HT731  
changed by  
16Amps

With quad  
shunts, orbit  
through the  
quad centers  
can be  
determine



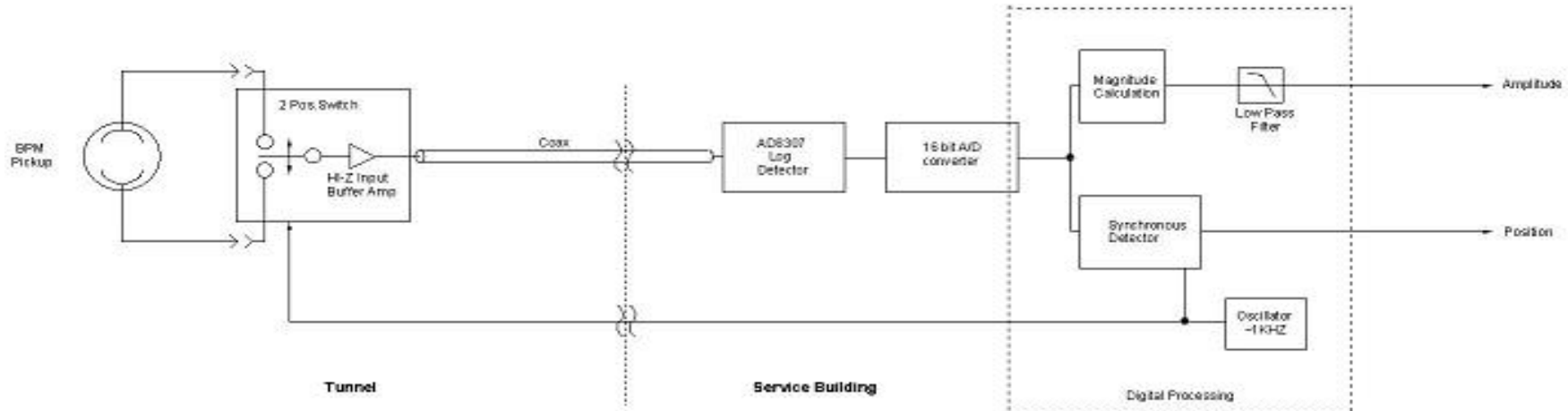
# Upgrade to BPM systems

Old original electronics and DAQ.

Reliability, maintenance, ease of use are issues

Debuncher (shown  $\sim 50\mu\text{m}$  resolution) 2.5MHz

Closed Orbit system (electronics, DAQ, software)  
Installed in 1 sector; remaining during shutdown



AP2 (desire  $<100\mu\text{m}$  resolution) 53MHz

Minimum is DAQ & software replacement

Need to determine if electronics are sufficient

# Other Instrumentation Work

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## AP2 BPM electronics

Half housed in same building as Debuncher injection kicker.

Move electronics to another building & re-cable.

## Re-install AP2 709 horiz. collimator

## AP2 large aperture Toroid(s)

Desire beam intensity measurement at different points along beam line.

## New

Move SEMs for optimal phase advance(?)

Other instrumentation as needed

# Summary

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We want to have reliable and easy to use instrumentation anytime proton studies become available

Main thrust is for upgrade BPM systems to be used with protons for lattice measurements and Beam Base Alignment

SEMs, Debuncher TBT and other to be used during stacking for Beam Based Alignment